# Center for Artificial Intelligence and Quantum Computing in System Brain Research (CLARA)

| | |
|---|---|
| ***Call for proposals*** | Horizon Europe: Teaming for Excellence (HORIZON-WIDERA-2023-ACCESS-01) |
| ***Budget*** | 43 mil. EUR |
| ***Project duration*** | 1.1.2025 – 31.12. 2030 |
| ***Consortium:*** *Czech Republic*  *France*  *Germany*  | CLARA consortium, coordinated by ***INDRC*** consists of six partners with expertise in neuroscience, AI, HPCQC, and molecular biology: ***Czech Technical University*** represents the foremost technical university in the Czech Republic. The Czech Institute of Informatics, Robotics, and Cybernetics implements cutting-edge research in the fields of computer science, robotics, cybernetics, AI, and related areas. ***VSB-Technical University of Ostrava*** represented by its IT4Innovations National Supercomputing Center is a leading research center in the field of HPC, big data analytics, and AI. IT4I operates the most powerful HPC systems in the country. ***ICRC***, the International Clinical Research Center at St. Anne's University Hospital, is a clinical research institution primarily focused on cardiology and neurology with more than 30 years of experience with molecular dynamics simulations of proteins. ***PBI,*** the Paris Brain Institute, is one of Europe's leading brain research institutes. PBI, represented by the Aramis team (a joint research team between CNRS, Inria, Inserm, and Sorbonne University based in the Pitié-Salpêtrière Hospital in Paris) is at the forefront worldwide on the topic of ML for medical imaging for brain research. ***BAdW-LRZ,*** Leibniz Supercomputing Centre, is one of Europe's leading supercomputing centers. Quantum Integration Center as part of the Munich Quantum Valley provides quantum and HPC-quantum hybrid resources for research scientists, incl. integration of quantum processors into supercomputing workflows. |

**The ambition of CLARA:** CLARA aims to establish the very first interdisciplinary Center of Excellence (CoE) focused on the next generation of artificial intelligence/machine learning (AI/ML) applications and quantum-accelerated supercomputing tools to solve the etiology of neurodegenerative diseases.

**CLARA´s ultimate goal:** CLARA seeks to push the frontier of neurodegeneration research, particularly Alzheimer's disease (AD), identify novel pathways to understand brain architecture/network complexity, and discover new intervention targets that ameliorate neurodegeneration.

**Major activities:**
1. *Establishment of three interdisciplinary Research programs (RP):*
   - RP1: Quantum-accelerated supercomputing and machine learning to address protein dynamics, aggregation, and modulation by small molecules
   - RP2: Expanding systems biology with clinical phenomenology of AD to understand time and scale coupling using generative AI and hybrid computing (HPCQC)
   - RP3: Development of multiscale/cross-modal patient/deep-learning models of AD in the hybrid quantum-classical computing environments
2. *Building an innovative distributed hybrid computing infrastructure – CLARA Testbed*
   - Equipping and linking existing facilities of CLARA partners into one unique HPCQC infrastructure to serve for experimenting with complex, parallel, and distributed multiscale modeling and simulations.
   - Contributing to the EuroHPC Joint Undertaking ecosystem by integration of CLARA Testbed with EuroHPC supercomputers and quantum computers
3. *Gathering excellent researchers and innovators to allow a new quality of interdisciplinary research*
   - Establishment of tenure track positions for a new generation of research leaders
   - Development and implementation of sound education and training programs (research mobility summer schools, internships, awards for young investigators)
   - Cooperation with industry by the development of joint industrial research and educational programs (industry-led PhDs and post-docs)
4. *Contributing to national strategies and addressing 21st-century societal challenges*
   - Establishment of the CLARA Collaboratorium as an open innovation ecosystem promoting CLARA´s brand, capacities, and technological resources based on open access, scientific networking, co-creation activities, and common standards.

For more information about CLARA contact: **vit.dockal@indrc.cz**